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## THE IMPACT OF BANK-BASED AND MARKET-BASED FINANCIAL DEVELOPMENT ON ECONOMIC GROWTH: TIME-SERIES EVIDENCE FROM THE UNITED KINGDOM

Sheilla Nyasha

Nicholas M. Odhiambo

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Sheilla Nyasha  
Department of Economics  
University of South Africa  
P.O Box 392, UNISA  
0003, Pretoria  
South Africa  
Email: [sheillanyasha@gmail.com](mailto:sheillanyasha@gmail.com)

Nicholas M. Odhiambo  
Department of Economics  
University of South Africa  
P.O Box 392, UNISA  
0003, Pretoria  
South Africa  
Email: [odhianm@unisa.ac.za](mailto:odhianm@unisa.ac.za) /  
[nmbaya99@yahoo.com](mailto:nmbaya99@yahoo.com)

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# THE IMPACT OF BANK-BASED AND MARKET-BASED FINANCIAL DEVELOPMENT ON ECONOMIC GROWTH: TIME-SERIES EVIDENCE FROM THE UNITED KINGDOM

Sheilla Nyasha<sup>1</sup> and Nicholas M. Odhiambo

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## Abstract

*This paper examines the dynamic impact of both bank-based and market-based financial development on economic growth in the United Kingdom (UK) during the period 1980 to 2012, using the autoregressive distributed lag bounds testing approach. Given the complexity of the financial structure in the United Kingdom, various financial development indicators have been used to construct bank-based and market-based financial development indices. The empirical results of this study show that while market-based financial development has a positive impact on economic growth in the United Kingdom, bank-based financial development has a distinct negative impact. These results apply irrespective of whether the regression analysis is conducted in the long run or in the short run.*

**Keywords:** United Kingdom, UK, Bank-based Financial Development, Market-based Financial Development, Economic Growth

**JEL Classification Code:** G10, G20, O16

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## 1. Introduction

The debate on the relationship between financial development and economic growth has been on-going for many years but with little consensus. Despite numerous empirical studies in both developed and developing economies on whether bank-based and market-based financial development have a positive or a negative impact on economic growth, the results have been far

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<sup>1</sup> Corresponding author: Sheilla Nyasha, Department of Economics, University of South Africa (UNISA). Email address: [sheillanyasha@gmail.com](mailto:sheillanyasha@gmail.com). This paper is based on the author's doctoral research at the University of South Africa (UNISA). The usual disclaimer applies.

from conclusive. Although empirical evidence is inclined towards the view that financial development – both bank- and market-based – has a positive impact on economic growth, evidence suggesting otherwise also exists. The evidence also suggests that the outcome varies from country to country and over time; and is also dependent on the model specified, methodology used and the variable used to proxy financial development.

There are studies that support Schumpeter's (1911) notion that financial development has a positive impact on economic growth, and that it reflects the close relationship between financial development and economic growth. Such studies include: Goldsmith (1969); McKinnon (1973); Shaw (1973); King and Levine (1993); Odedokun (1996); Kargbo and Adamu (2009); Hassan *et al.* (2011); Levine and Zervos (1996); and Akinlo and Akinlo (2009). However, there are also studies that acknowledge the existence of a relationship between financial development and economic growth, but have proceeded to state that this relationship is negative. Thus, according to these studies, financial development, bank-based or market-based, has a negative impact on economic growth. These studies include: Van Wijnbergen (1983); Buffie (1984); De Gregorio and Guidotti (1995); Adu *et al.* (2013); Ujunwa and Salami (2010); and Bernard and Austin (2011), among others.

Besides these two groups of empirical evidence, there are other studies that conclude that financial development, whether bank- or market-based, has no impact on economic growth, and that the two are not related. Lucas (1988), Stern (1989), Ram (1999) and Andersen and Tarp (2003) are some of such studies. Thus, given the currently available evidence, the question of whether or not financial development has an impact on economic growth – positive or negative –

remains an issue for empirical examination. Unfortunately, the majority of the previous studies on this topic have concentrated mainly on Asia, Latin America and Africa, leaving the United Kingdom (UK) with little coverage, although it is one of the world's biggest economies and is closely followed by economists and analysts.

Against this background, this study attempts to investigate empirically the long-run and short-run impact of bank-based and market-based financial development on economic growth in the UK. Unlike some of the previous studies that have mostly relied on the residual-based cointegration test – associated with Engle and Granger (1987), and the maximum-likelihood test based on Johansen (1988) and Johansen and Juselius (1990), this study employs the recently developed autoregressive distributed lag (ARDL) bounds approach to cointegration. This approach is appropriate even when the sample size is too small (see also Odhiambo, 2008).

Also, unlike the majority of previous studies, this study splits financial development into bank- and market-based components and examines the relative impact of each component on economic growth. To capture the depth and breadth of the UK's financial sector, the study uses indices of bank-based and market-based financial development that are constructed from an array of bank- and market-based financial development indicators using a method of means-removed average. The use of these indices ensures that a holistic picture of the relationship between financial development and economic growth in the study country is captured.

Finally, unlike most of the previous studies that over-relied on cross-sectional data, which may not have satisfactorily addressed country-specific issues (Ghirmay, 2004; Odhiambo, 2009), this

study employs time-series data analysis methods to address country-specific issues. Hence the findings of this study will assist in providing specific policy guidance on the UK's finance-growth matters.

The rest of the paper is structured as follows: The second section provides an overview of the UK's financial sector while the third section reviews literature on bank-based financial development, market-based financial development and economic growth. The fourth section covers the methodology of the study while the fifth section presents and discusses the empirical results. The sixth section concludes the paper.

## **2. An Overview of the UK's Financial Sector**

The UK's financial system is by any standard, modern or otherwise, one of the most highly developed financial systems in the world. According to the Bank of England (2012), the financial system plays a very important role in the functioning of the UK economy. Both the bank-based and the market-based segments of the UK's financial system are well developed.

At the apex of the UK's financial system is the Bank of England, which is the central bank of the UK. Its role is to promote and maintain monetary and financial stability so as to ensure a healthy economy (Bank of England, 2012). Although the Bank of England was established as the Government's banker and debt-manager, its role developed over time to include a focus on the management and oversight of the economy's currency (Bank of England, 2012). According to International Monetary Fund (2011), the UK financial sector is large, with bank balance sheets

amounting to approximately five times GDP. The UK stock market, anchored by London Stock Exchange, is also highly developed and amongst the top stock markets globally.

Over the years, the UK's financial sector underwent a myriad of reforms in an effort to meet national demands for development as well as global demands for modernisation. In the banking sector, these reforms concentrated on improving the legal, judiciary, regulatory and supervisory environments, promoting financial liberalisation, rehabilitating the financial infrastructure, and restoring bank soundness. From the stock market front, the reforms have addressed the legal, regulatory, judiciary and supervisory aspects of the market, as well as the modernisation of the trading environment.

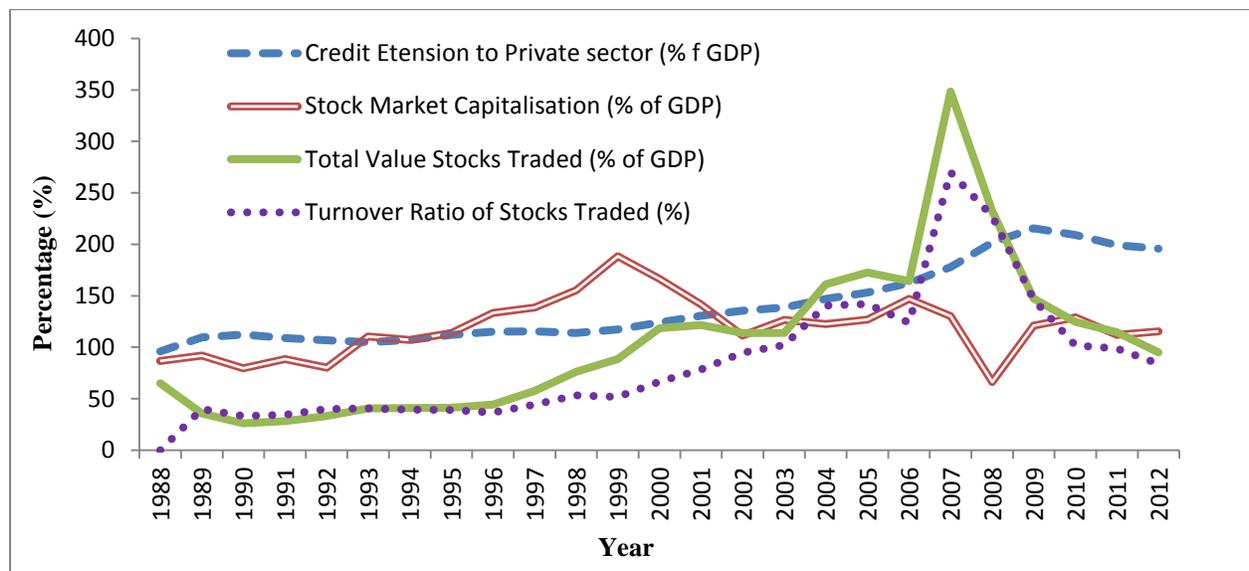
The UK financial sector responded largely positively to these rigorous reforms. The growth of the UK's banking sector is evidenced by growth in private sector credit extension from 50% of GDP in 1975 to a peak of 229.2% in 2009, before declining slightly to 222.6% in 2010 and still further to 213.8% in 2011 (World Bank, 2012). The growth of the UK banking sector can also be depicted by the increasing number of automated teller machines from 34 000 in year 2000 to almost 65 000 in 2010 (Bank of England, 2010).

On the stock market side, these reforms gave rise to an increase in stock market capitalisation, total value traded and turnover ratio. Stock market capitalisation expressed as a percentage of GDP grew from just below 100% between 1988 and 1992 to a peak of 195.2% in 1999 (World Bank, 2012). However, during the year 2000, the stock market size dwindled sharply, only to improve after 2002, although it failed to reach its 1999 size. In 2007, the UK stock market suffered another blow, which saw the market capitalisation tumbling, reaching a low of 69.7% in

2008. Since then the market has never fully recovered from the aftermath of the financial crisis of the late 2000s (World Bank, 2012).

In terms of market liquidity, as measured by total value traded/GDP and turnover ratio, the UK had a less liquid stock market until 1997 when the total value of stocks traded improved from 61% to 126.5% in 2001 to 182.8% in 2005, before further increasing to a peak of 367.3% in 2007 (World Bank, 2012). However, it declined sharply soon afterwards to 246.1% in 2008 and further to 122.2% in 2011. The turnover ratio depicted the same trend as that of total value of stocks traded, reaching its peak in 2007 at 269.8%, before sharply declining to 227.2% in 2008, 146.4% in 2009, 101.9% in 2010, and then slightly increased to 137.9% in 2011 (World Bank, 2012). Figure 1 tracks the performance and growth of the UK’s banking sector – based on credit extension to the private sector – and the stock market – based on stock market capitalisation, total value of stocks traded and turnover ratio of stocks traded – during the period 1988-2012.

**Figure 1: Trends in Banking Sector and Stock Market Growth in the UK (1988-2012)**



Source: World Bank Indicators (2015)

Despite this growth, the UK's financial system still faces some challenges. According to the International Monetary Fund (2011), these challenges include: less than adequate disclosure standards, contagion risk from the Eurozone, and squeezed interest margin and uncertainties caused by changes in regulatory regimes. The UK stock market also faces the challenges that come with the globalisation of financial markets which has escalated rapidly in recent decades (HM Treasury, 2009). According to the HM Treasury (2009), it has become easy for financial firms and markets to operate across borders, thus leading to the emergence and growing importance of large, complex financial institutions operating on an international scale.

### **3. Literature Review**

The relationship between bank-based financial development and economic growth, on the one hand, and between market-based financial development and economic growth, on the other hand, has recently received widespread attention from numerous empirical studies globally. Although it is now well recognised that financial development, bank- or market-based, is positively associated with economic growth, there is also empirical evidence suggesting otherwise.

Some of those studies that have examined the relative impact of bank-based financial development on economic growth include those by De Gregorio and Guidotti (1995), Odedokun (1996), Ahmed and Ansari (1998), Ram (1999), Andersen and Tarp (2003), Christopoulos and Tsionas (2004), Bolbol *et al.* (2005), Guryay *et al.*, (2007), Kargbo and Adamu (2009), Yonezawa Azeez (2010), Hassan *et al.* (2011), and Adu *et al.* (2013). All of these studies found that bank-based financial development has a positive impact on economic growth in various study countries, except the studies by De Gregorio and Guidotti (1995), Bolbol *et al.* (2005) and

Adu *et al.* (2013) that found evidence of a negative relationship between the two in some isolated instances, and studies by Ram (1999) and Andersen and Tarp (2003) that found that bank-based financial development does not have a significant impact on economic growth.

From the market-based financial development front, a number of studies have examined the impact of market-based financial development on economic growth. These studies include: Levine and Zervos (1996), Caporale *et al.* (2003), Bekaert *et al.* (2005), Adjasi and Biekpe (2006), Nurudeen (2009), Akinlo and Akinlo (2009), Ujunwa and Salami (2010) and Bernard and Austin (2011). All these studies have found that market-based financial development has a positive impact on economic growth, except for studies by Ujunwa and Salami (2010) and Bernard and Austin (2011) that found the relationship between market-based financial development and economic growth to be positive in some countries but also negative in other countries. Table 1 summarises the empirical studies on the impact of bank-based financial development on economic growth while Table 2 presents a summary of studies on market-based financial development and economic growth.

**Table 1: Studies Showing the Nature of Impact of Bank-Based Financial Development on Economic Growth**

Author(s)	Region/Country	Methodology	Variables	Nature of Impact
De Gregorio and Guidotti, 1995	A large number of countries	– Cross-sectional data	– GDP per capita – Credit – Investment – Human capital accumulation – Government spending – Political instability	Positive impact (in a large cross-country sample)
Odedokun, 1996	LDCs - 71 developing countries	– Ordinary Least Squares (OLS) techniques – Generalized Least Squares (GLS) technique	– Annual growth rate of the real GDP – Financial depth – Labour force growth – Investment/GDP ratio – Real export growth	Positive impact (in 85% of the 71 countries)
Ahmed and Ansari, 1998	India, Pakistan and Sri Lanka	– Pooled data based on time-series and cross-sectional observations	– Per capita real GDP – Per capita nominal GDP – M2/GDP – Quasi-money/GDP – Domestic credit to nominal GDP	Positive association
Allen and Ndikumana, 2000	8 countries in Southern Africa – Botswana, Lesotho, Mauritius,	– Cross-sectional data analysis	– Per capita GDP – Ratio of M3 to GDP – Market capitalisation – Total value traded	Positive association

<b>Author(s)</b>	<b>Region/Country</b>	<b>Methodology</b>	<b>Variables</b>	<b>Nature of Impact</b>
	Malawi, Swaziland, South Africa, Zambia and Zimbabwe		– Gross domestic investment	
Güryay <i>et al.</i> , 2007	Northern Cyprus	– Time-series – Ordinary Least Squares techniques	– Annual growth rates of real GDP – Annual population growth – Annual growth of export – Ratio of domestic investments to GDP – Ratio of deposits to GDP – Ratio of loan to GDP	Positive impact (though negligible)
Kargbo and Adamu, 2009	Sierra Leone	– Time-series – ARDL approach	– Real GDP – Financial development index – Investment – Real deposit rate	Positive impact
Hassan <i>et al.</i> , 2011	Low- and middle-income countries	– Panel regressions – Variance decompositions	– GDP per capita – Domestic credit provided by the banking sector to GDP – Domestic credit to the private sector as a percentage of GDP – M3 to GDP – Gross domestic savings to GDP	Positive impact
Adu <i>et al.</i> , 2013	Ghana	– Time-series – ARDL approach	– Real GDP – Credit to the private sector as ratio to	Positive impact (when credit to the private sector as ratio to

Author(s)	Region/Country	Methodology	Variables	Nature of Impact
			<ul style="list-style-type: none"> <li>GDP</li> <li>- Total domestic credit</li> <li>- Broad money stock to GDP ratio</li> <li>- Real gross fixed capital formation to GDP ratio</li> <li>- Real gross government expenditure</li> <li>- Trade openness</li> <li>- Inflation</li> <li>- Financial liberalisation dummy</li> </ul>	GDP and total domestic credit are used as proxies of financial development)
De Gregorio and Guidotti, 1995	A large number of countries	- Cross-sectional data	<ul style="list-style-type: none"> <li>- GDP per capita</li> <li>- Credit</li> <li>- Investment</li> <li>- Human capital accumulation</li> <li>- Government spending</li> <li>- Political instability</li> </ul>	Negative impact (in Latin America)
Odedokun, 1996	LDCs - 71 developing countries	<ul style="list-style-type: none"> <li>- OLS techniques</li> <li>- Generalized Least Squares (GLS) technique</li> </ul>	<ul style="list-style-type: none"> <li>- Annual growth rate of the real GDP</li> <li>- Financial depth</li> <li>- Labour force growth</li> <li>- Investment-GDP ratio</li> <li>- Real export growth</li> </ul>	Negative impact (in 15% of the 71 countries)
Adu <i>et al.</i> , 2013	Ghana	<ul style="list-style-type: none"> <li>- Time-series</li> <li>- ARDL approach</li> </ul>	<ul style="list-style-type: none"> <li>- Real GDP</li> <li>- Credit to the private sector as ratio to</li> </ul>	Negative impact (when broad money

<b>Author(s)</b>	<b>Region/Country</b>	<b>Methodology</b>	<b>Variables</b>	<b>Nature of Impact</b>
			<ul style="list-style-type: none"> <li>GDP</li> <li>- Total domestic credit</li> <li>- Broad money stock to GDP ratio</li> <li>- Real gross fixed capital formation to GDP ratio</li> <li>- Real gross government expenditure</li> <li>- Trade openness</li> <li>- Inflation</li> <li>- Financial liberalisation dummy</li> </ul>	stock to GDP ratio is used as proxies of financial development)
Ram, 1999	95 countries	Individual/country group time-series	<ul style="list-style-type: none"> <li>- GDP Growth</li> <li>- Financial development</li> <li>- Export growth</li> <li>- Investment as a share of GDP</li> </ul>	No impact
Andersen and Tarp, 2003	74 countries	Cross-section	<ul style="list-style-type: none"> <li>- Private credit</li> <li>- GDP per capita</li> <li>- Commercial bank assets to commercial bank plus central bank assets</li> <li>- Liquid liabilities</li> <li>- legal origin dummy</li> <li>- Education</li> <li>- Initial GDP per capita</li> <li>- Region</li> <li>- Education</li> </ul>	No impact

**Table 2: Studies Showing the Nature of Impact of Market-Based Financial Development on Economic Growth**

Author(s)	Region/Country	Methodology	Variables	Nature of Impact
Levine and Zervos, 1996	41 countries	– Cross-country regressions	– Market capitalisation – Total value of trades – Turnover ratio – Initial education	Positive impact
Caporale <i>et al.</i> , 2003	Four developing countries (Chile, Korea, Malaysia and the Philippines)	– Quarterly time-series	– GDP in levels – Market capitalisation ratio – Value traded ratio – Level of investment – Investment productivity	Positive impact
Bekaert <i>et al.</i> 2005	A large number of countries		– real per capita GDP – Turnover and 25 other variables	Positive impact
Adjasi and Biekpe, 2006	14 African countries	– Dynamic panel data modelling	– GDP – Market capitalisation to GDP – Total value of shares traded to GDP – Turnover ratio – Investment – Trade	Positive impact
Nurudeen, 2009	Nigeria	– Time-series – Error correction approach	– Real GDP – Market capitalisation – Market turnover – Openness – Minimum rediscount rate	Positive impact

<b>Author(s)</b>	<b>Region/Country</b>	<b>Methodology</b>	<b>Variables</b>	<b>Nature of Impact</b>
Akinlo and Akinlo, 2009	Seven countries in sub-Saharan Africa	ARDL bounds test	<ul style="list-style-type: none"> <li>- Per capita nominal GDP</li> <li>- Value traded ratio</li> <li>- Market capitalisation ratio</li> <li>- Discount rate</li> <li>- Openness ratio</li> </ul>	Positive impact
Ujunwa and Salami, 2010	Nigeria	<ul style="list-style-type: none"> <li>- Time-series</li> <li>- Ordinary Least Squares techniques</li> </ul>	<ul style="list-style-type: none"> <li>- GDP per capita</li> <li>- Total market capitalisation Total value of shares traded</li> <li>- Turnover ratio</li> <li>- Inflation rate</li> <li>- Gross capital formation</li> <li>- Government consumption expenditure</li> </ul>	Positive impact (when stock market development is proxied by stock market size and turnover ratios)
Bernard and Austin, 2011	Nigeria	<ul style="list-style-type: none"> <li>- Time-series</li> <li>- Ordinary Least Squares techniques</li> </ul>	<ul style="list-style-type: none"> <li>- Real GDP</li> <li>- Stock market capitalisation</li> <li>- Value traded ratio</li> <li>- Turnover ratio</li> </ul>	Positive impact (when stock market development is proxied by turnover ratio)
Ujunwa and Salami, 2010	Nigeria	<ul style="list-style-type: none"> <li>- Time-series</li> <li>- Ordinary Least Squares techniques</li> </ul>	<ul style="list-style-type: none"> <li>- GDP per capita</li> <li>- Total market capitalisation Total value of shares traded</li> <li>- Turnover ratio</li> <li>- Inflation rate</li> <li>- Gross capital formation</li> <li>- Government consumption expenditure</li> </ul>	Negative impact (when stock market development is proxied by total value of shares traded)

<b>Author(s)</b>	<b>Region/Country</b>	<b>Methodology</b>	<b>Variables</b>	<b>Nature of Impact</b>
Bernard and Austin, 2011	Nigeria	<ul style="list-style-type: none"> <li>- Time-series</li> <li>- Ordinary Least Squares techniques</li> </ul>	<ul style="list-style-type: none"> <li>- Real GDP</li> <li>- Stock market capitalisation</li> <li>- Value traded ratio</li> <li>- Turnover ratio</li> </ul>	Negative impact (when stock market development is proxied by market capitalisation and value traded ratios)

## **4. Estimation Techniques and Empirical Analysis**

### **4.1 ARDL Bounds-Testing Approach**

The recently developed autoregressive distributed lag (ARDL) bounds testing approach has been employed to investigate the impact of bank-based and market-based financial development on economic growth. This test offers numerous advantages over other conventional cointegration tests – such as the residual-based approach and the full maximum likelihood test. Some of these advantages include the following: (i) ARDL bounds testing approach can be employed irrespective of whether the regressors are integrated of the same order or not, as long as they are integrated of order not more than one; (ii) the technique provides unbiased estimates of the long-run model and valid t statistics even when some of the regressors are endogenous (Odhiambo, 2008); (iii) unlike the conventional cointegration methods that estimate the long-run relationships within a context of a system of equations, the ARDL method employs only a single reduced-form equation (see also Duasa, 2007); (iv) the ARDL test has superior small sample properties, when compared to the other conventional methods of testing cointegration (Pesaran and Shin, 1999); and (v) the ARDL test is appropriate even when the sample size is small, as opposed to other cointegration techniques that are sensitive to the size of the sample. The ARDL approach is, therefore, considered to be very appropriate for analysing the finance-growth nexus in this paper. Of late, the method has also been increasingly used in empirical research.

### **4.2 Model Specification**

The empirical model used in this study to test the impact of financial development, both bank-based and market-based, on economic growth is specified as follows:

$$y_t = \rho_0 + \rho_1 B_t + \rho_2 M_t + \rho_3 I_t + \rho_4 S_t + \rho_5 T_t + \varepsilon_t \dots \dots \dots (1)$$

where  $y$  is the growth rate of real gross domestic product – a proxy for economic growth;  $B$  is an index of bank-based financial development, which is a means-removed average of M2, M3 and credit provided to the private sector by financial intermediaries – a proxy for bank-based financial development (see also Demirguc-Kunt and Levine, 1996);  $M$  is an index of market-based financial development, which is a means-removed average of stock market capitalisation, stock market traded value and stock market turnover – a proxy for market-based financial development (see also Demirguc-Kunt and Levine, 1996);  $I$  is investment, calculated as gross fixed capital formation as a percentage of GDP;  $S$  is gross savings as a percentage of GDP;  $T$  is trade openness, which is the sum of the share of total imports in GDP and the share of total exports in GDP;  $\rho_0$  is a constant;  $\rho_1$ - $\rho_5$  are respective coefficients and  $\varepsilon$  is the error term.

To calculate a conglomerate index of market-based financial development ( $M$ ), means-removed values of the three market-based financial development indicators are averaged in a two-step process. Firstly, the means-removed values of stock market capitalisation ( $CAP$ ), the total value traded ( $TV$ ), and turnover ratio ( $TOR$ ) are computed. The means-removed value of variable  $Y$  is defined as  $Y_m = [Y - \text{mean}(Y)] / [ABS(\text{mean}(Y))]$ , where  $ABS(z)$  refers to the absolute value of  $z$ . For  $\text{mean}(Y)$ , the average value of  $Y$  over the 1980-2012 period was used. Second, a simple average of the means-removed  $CAP$ ,  $TV$  and  $TOR$  is taken to obtain an overall index of market-based financial development ( $M$ ). The same computations are applied to obtain  $B$ .

The ARDL model based on the specified empirical model in equation (1) is expressed as follows:

$$\begin{aligned} \Delta y_t = & \rho_0 + \sum_{i=1}^n \rho_{1i} \Delta y_{t-i} + \sum_{i=0}^n \rho_{2i} \Delta B_{t-i} + \sum_{i=0}^n \rho_{3i} \Delta M_{t-i} + \sum_{i=0}^n \rho_{4i} \Delta I_{t-i} + \sum_{i=0}^n \rho_{5i} \Delta S_{t-i} \\ & + \sum_{i=0}^n \rho_{6i} \Delta T_{t-i} + \theta_1 y_{t-1} + \theta_2 B_{t-1} + \theta_3 M_{t-1} + \theta_4 I_{t-1} + \theta_5 S_{t-1} \\ & + \theta_6 T_{t-1} + \mu_{1t} \dots \dots \dots (2) \end{aligned}$$

where:  $\rho_6$  and  $\theta_1 - \theta_6$  are respective regression coefficients;  $\Delta$  is the difference operator;  $n$  is the lag length; and  $\mu_t$  is the white noise error term. The rest of the variable description follows the description under equation (1).

The associated ARDL based error correction model is specified as follows:

$$\begin{aligned} \Delta y_t = & \rho_0 + \sum_{i=1}^n \rho_{1i} \Delta y_{t-i} + \sum_{i=0}^n \rho_{2i} \Delta B_{t-i} + \sum_{i=0}^n \rho_{3i} \Delta M_{t-i} + \sum_{i=0}^n \rho_{4i} \Delta I_{t-i} + \sum_{i=0}^n \rho_{5i} \Delta S_{t-i} \\ & + \sum_{i=0}^n \rho_{6i} \Delta T_{t-i} + \varphi ECM_{t-1} + \mu_t \dots \dots \dots (3) \end{aligned}$$

## 5.2 Data Sources

The annual time series data utilised in this study, covering the period from 1980 to 2012, were obtained from the World Bank Economic Indicators and the London Stock Exchange.

## 5. Empirical Results

### 5.1 Unit Root Tests

Prior to any analysis, the variables are first tested for stationarity using Dickey-Fuller Generalised Least Square (DF-GLS) and Phillips-Perron (PP) unit root tests. The detailed results of stationarity tests for all the variables are presented in Table 3.

**Table 3: Stationarity Tests for all Variables**

<b>Dickey-Fuller Generalised Least Square (DF-GLS)</b>				
<b>Variable</b>	<b>Stationarity of all Variables in Levels</b>		<b>Stationarity of all variables in First Difference</b>	
	Without Trend	With Trend	Without Trend	With Trend
y	-2.354**	-2.865	–	-5.709***
FDB	-0.409	-1.909	-3.944***	-3.901***
FDM	-1.585	-2.749	-6.341***	-6.464***
INV	-2.269**	-3.931***	–	–
SAV	-0.796	-2.282	-4.615***	-4.879***
TOP	-0.901	-2.504	-5.678***	-6.260***
<b>Phillips-Perron (PP)</b>				
<b>Variable</b>	<b>Stationarity of all Variables in Levels</b>		<b>Stationarity of all variables in First Difference</b>	
	Without Trend	With Trend	Without Trend	With Trend
y	-3.226**	-3.122	–	-7.056***
FDB	-0.932	-2.742	-6.597***	-6.484***
FDM	-1.891	-2.564	-6.329***	-6.371***
INV	-1.617	-2.322	-3.673***	-3.856**
SAV	-1.333	-2.311	-4.695***	-4.634***
TOP	-0.587	-2.437	-6.456***	-9.179 ***

Note: \*\* and \*\*\* denote stationarity at 5% and 1% significance levels respectively

Results reported in Table 3 show that the stationarity of the variables is mixed, depending on the stationarity testing method used and whether or not a trend has been included. However, after differencing the variables once, all the variables became conclusively stationary.

While the ARDL does not require pre-testing of variables, the stationarity test gives guidance as to whether ARDL is suitable or not, as it is only appropriate for the analysis of variables that are integrated of order zero or one. In this instance, no variable is found to be integrated of two (2) or higher; hence, the ARDL bounds testing method can be used.

## 5.2 Bounds F-Test for Cointegration

In this section, the long-run relationship between the variables in the specified model is examined using the ARDL bounds testing method. The first step is to get the order of lags on the first differenced variables in equations (2) using either the Akaike Information Criterion or the Schwartz Bayesian Criterion. This is followed by the second step, which is the application of a bounds F-test to equation (2) to establish the existence of a long-run relationship between the variables under study. The results of the bounds F-test are displayed in Table 4.

**Table 4: Bounds F-Test for Cointegration**

Dependent Variable	Function		F-statistic		Cointegration Status	
y	F(y B, M, I, S, T)		4.783***		Cointegrated	
<b>Asymptotic Critical Values</b>						
Pesaran <i>et al.</i> (2001), p.300, Table CI(iii) Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.41	4.68	2.62	3.79	2.26	3.35

Note: \*\*\* denotes statistical significance at 1% level

The results of the ARDL bounds test for cointegration (Table 4) show that the calculated F-statistic of 4.783 is higher than the critical values reported by Pesaran *et al.* (2001) in Table CI(iii) Case III. Based on these results, it can be concluded that the variables in the specified model are cointegrated.

### 5.3 The ARDL Model Estimation

Having established that  $y$ ,  $B$ ,  $M$ ,  $I$ ,  $S$  and  $T$  are cointegrated, the ARDL procedure is used in the estimation of the model. Firstly, the optimal lag-length for the specified model is determined using the Akaike information criterion (AIC) or the Bayesian information criterion (BIC). The optimal lag-length selected based on BIC is ARDL(1,0,0,1,1,0). The BIC-based model was chosen because it was more parsimonious than AIC-based model. The long-run and short-run results of the selected model are reported in Table 5 Panel I and Panel II, respectively.

**Table 5: Empirical Results of the Estimated ARDL Model**

<b>Panel I:</b> Estimated long-run coefficients [Dependent variable: real GDP growth rate ( $y$ )]			
Regressor		Co-efficient (t-statistic)	
C		24.43** (2.39)	
B		-0.06*** (-2.86)	
M		0.02** (2.36)	
I		-0.40 (-1.22)	
S		-0.50* (-1.94)	
T		-0.09 (-0.79)	
<b>Panel II:</b> Estimated short-run coefficients [Dependent variable: real GDP growth rate ( $\Delta y$ )]			
$\Delta B$		-0.05*** (-2.84)	
$\Delta M$		0.02** (2.26)	
$\Delta I$		0.96*** (3.77)	
$\Delta S$		0.09 (0.37)	
$\Delta T$		-0.07 (-0.83)	
Ecm (-1)		-0.80*** -6.69)	
R-Squared	0.812	R-Bar-Squared	0.746
SE of Regression	1.023	F-Stat F(6,24)	16.541[0.000]
Residual Sum of Squares	24.073	DW statistic	1.946
Akaike Info. Criterion	-49.852	Schwarz Bayesian Criterion	-56.448

Note: \*, \*\* and \*\*\* denote stationarity at 10%, 5% and 1% significance levels respectively.

The regression results reported in Table 5 show that in the UK, market-based financial development is positively related to economic growth. Thus, in this economy, market-based financial development has a positive impact on economic growth. These results apply irrespective of whether the model is estimated over the long run or the short run. The long-run impact is supported by the coefficient of market-based financial development in Panel I that is statistically significant and positive, as expected. The short-run impact is shown by the coefficient of market-based financial development in Panel II that is also statistically significant and positive, as expected.

Results presented in the same table also show that contrary to the expectation, bank-based financial development has been found to have a negative impact on the economic growth in the UK, both in the long run and in the short run. The long-run negative impact is evidenced by the coefficient of bank-based financial development in Panel I that is statistically significant but negative, while the short-run impact is supported by the coefficient of bank-based financial development in Panel II that is also statistically significant but negative. Although the bank-based financial development coefficient for this study country has an unexpected sign, it is not unique to this study alone. Several other studies have shown evidence of negative association between bank-based financial development and economic growth (see also De Gregorio and Guidotti, 1995; Adu et al., 2013).

Other results reported in Table 5 show that the coefficient of investment, although it is statistically insignificant in the long run, is positive and statistically significant as expected in the short run. This suggests that in the UK, investment impacts positively on economic growth, but only in the short run. The coefficient of savings ratio is negative and statistically significant in the long run, but it is insignificant in the short run. Trade openness was found

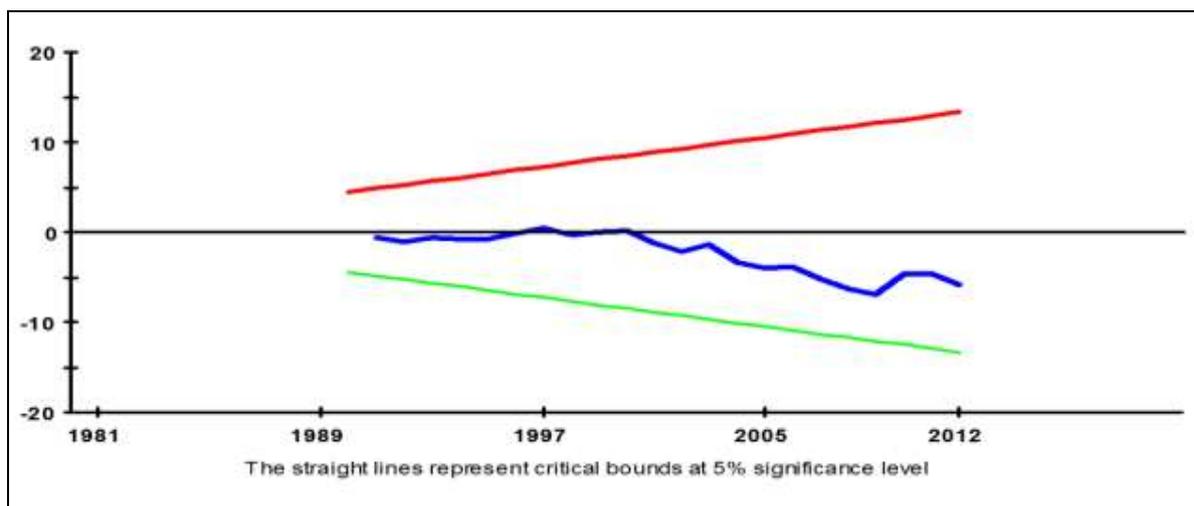
to have an insignificant impact on economic growth in the UK. The results also reveal that the coefficient of ECM (-1) is negative and statistically significant as expected.

As indicated by an R-squared of 81.2%, the regression of the underlying ARDL model fits well. On tests performed for functional form, serial correlation, heteroscedasticity and normality, the results presented in Table 6 show that the model passed all except the functional form. Nevertheless, an inspection of the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) graphs in Figures 2 and 3 respectively shows that there is stability and that there is no systematic change identified in the coefficients at 5% significance level over the study period. Thus, the CUSUM and CUSUMSQ graphs confirm that the parameters in this model are stable throughout the sample period.

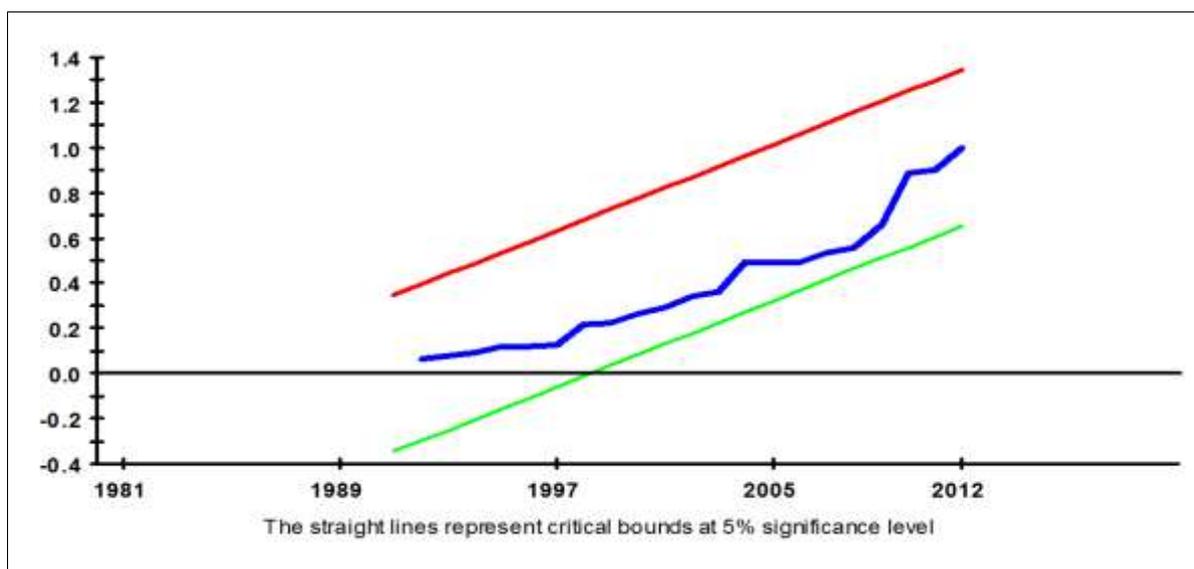
**Table 6: Diagnostic Tests**

<b>LM Test Statistic</b>	<b>Results [Probability]</b>
Heteroscedasticity: CHSQ (1)	0.208[0.648]
Serial Correlation: CHSQ(1)	0.002[0.965]
Functional Form: CHSQ(1)	5.398[0.037]
Normality: CHSQ (2)	1.656[0.437]

**Figure 2: Plot of Cumulative Sum of Recursive Residuals**



**Figure 3: Plot of Cumulative Sum of Squares of Recursive Residuals**



## 6. Conclusion

This study has examined the dynamic impact of bank-based financial development and market-based financial development on economic growth in the UK during the period 1980 to 2012. The UK's financial system is by any standard, modern or otherwise, one of the most highly developed financial systems in the world; and according to the Bank of England (2012), it plays a very important role in the functioning of the UK's economy. Although a

number of studies have been conducted on finance-growth nexus, the majority of the previous studies mainly focused on the bank-based side of financial development and paid little attention to the market-based side. Even where studies that focus on market-based financial development and economic growth have been undertaken, the empirical findings have been largely inconclusive; and only a handful have been on the UK in particular. The current study uses the recently developed ARDL bounds testing technique to examine this relationship. This technique has been increasingly used in recent years because of its best small sample size properties, among other properties. This study also employs the method of means-removed average to construct both bank-based and market-based financial development indices. The empirical results of this study show that in the UK, market-based financial development has a positive impact on economic growth. These results apply irrespective of whether the model is estimated in the long run or in the short run. However, bank-based financial development was found to have a negative impact on economic growth, irrespective of whether the regression analysis is conducted in the long run or in the short run. These results imply that in the UK, it is of paramount importance to concentrate more on pro-financial markets development policies, which focus on the development of the market-based segment of the UK financial sector – since it is this segment, rather than the bank-based segment, that has been found to impact positively on the country's real sector.

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